WKS – Chem 1
Nuclear Radiation

Name Answer Key
Period _____ Date _____

Read Ch. 25.1 pp. 804-809

Part I. Overview

1. Define nuclear radiation. What is radioactive decay? What is a radioactive nuclide?
   Nuclear radiation is the particle or energy emitted by a nucleus during radioactive decay.
   Radioactive decay is the emission of nuclear radiation from an unstable nucleus as it becomes more stable.
   A radioactive nuclide is any radioactive isotope that is unstable and can undergo radioactive decay.

2. List the 5 main kinds of nuclear decay and their properties:
   Alpha particle: He-4 nucleus; mass = 4.003 amu; 2+ charge; stopped by paper/cloth; deflected in mag field
   Beta particle: electron; mass = $\frac{1}{1823}$ amu; 1– charge; stopped by metal plate; deflected in mag. field
   Positron: positive electron; mass = $\frac{1}{1823}$ amu; 1+ charge; stopped by metal plate; deflected in mag. field
   Electron capture: electron as reactant particle
   Gamma radiation: EM radiation; no mass or charge; penetrates thick lead; not deflected.
3. What type of radiation is least penetrating (easiest to stop)? Which is most penetrating?
   Alpha particles are least penetrating (stopped by paper or cloth). Gamma rays are hardest to stop, even penetrating thick lead.

4. Which type of radiation will be deflected most in an electric or magnetic field? Why? Which will be deflected least and why?
   Beta particles (and also positrons) are deflected most because they have the highest charge/mass ratio: 1/(1/1840) = 1840 (in contrast, alpha particles have only a 2/4 or 0.5 ratio). Gamma rays are not deflected at all because they are uncharged electromagnetic radiation (high energy light).

5. When will a nucleus stop undergoing decay processes?
   When it reaches a stable product nucleus.